

19. (Amended) The method according to Claim 16 further comprising grinding the backside of said semiconductor substrate after said step of applying a protective tape and prior to said step of removing said protective tape.

REMARKS

Examiner B. Kebede is thanked for the thorough examination and search of the subject Patent Application and for finding allowable subject matter in Claims 5, 13, and 19. Claims 9, 13, 16, and 19 have been amended.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of Claims 1-4, 6-12, 14-18, and 20, rejected under 35 U.S.C. 103(a) as unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Blalock (US 5,320,981) is requested based on the following remarks.

Applicant agrees that Blalock discloses a method to form sloping walls on the openings in a photoresist layer. However,

Applicant notes that the dry etch process disclosed by Blalock etches both the photoresist layer and the substrate at the same time in order to replicate the sloped profile in the substrate (Col. 2, lines 22-25). By comparison, Applicant's method only etches the underlying passivation layer 68 but not the photoresist layer 72 (page. 12, Fig. 8). It does not appear that the sidewall slope, patterning method disclosed in Blalock is the same as that disclosed by the Applicant. It is further noted that Figs. 1-3 of Blalock do not correspond to the above described sidewall method. Rather, Figs. 1-3 of Blalock correspond to a completely different method used to facet the edges of a dielectric layer 14.

Since the patterning method disclosed in Blalock is not the same as that disclosed by the Applicant, Applicant's Claim 1 should be in condition for allowance. Further, dependent Claims 2-8 represent patentably distinct further limitations on Claim 1 and should, therefore, be in condition for allowance.

Claim 9 has been amended in two ways. First, Applicant notes Examiner's indication that Claim 13, which depends from Claim 9, would be allowable if re-written in independent form including all of the limitations of the base claim and any

TSMC-00-166

intervening claims. Claim 9 has therefore been re-written to include the limitations found in original Claim 13, and, specifically, the limitations regarding the reflow time and temperature. Second, the Examiner indicated that Claim 5 (same limitation as Claim 13), which depends from Claim 1, would also be allowable if re-written to independent form. Therefore, Claim 9 has also been amended to include only those limitations found in Claim 1 plus dependent Claim 5.

Since Amended Claim 9 now contains the same limitations as would be found in an independent-form "Amended Claim 5", and since this "Amended Claim 5" would be allowable, therefore, Amended Claim 9 should be in condition for allowance. Further, Claims 10-12 and 14-15 should be in condition for allowance since these depend from Amended Claim 9 and since these represent further patentably distinct limitations.

Since the limitation of original Claim 13 is now incorporated into Amended Claim 9, Claim 13 has now been amended. Claim 13 now contains a limitation that was included in original Claim 9 (but not Claim 1). Namely, Amended Claim 13 now contains the limitation that the removal of the protective tape is performed using a peeling tape. Since Amended Claim 13

TSMC-00-166

represents a patentably distinct limitation on Amended Claim 9, and since Amended Claim 9 should be in condition for allowance, therefore, Amended Claim 13 should also be in condition for allowance.

Claim 16 has been amended in similar fashion to Claim 9. First Claim 16 has been amended to add the limitation regarding the reflow parameters as in Claim 19 (and Claims 5 and 13). Second, Claim 16 has been amended to remove limitations beyond those found in original Claim 9. Therefore, Amended Claim 16 is essentially the same as what original Claim 13 would include if re-written in independent form. Since such a re-written Claim 13 would be allowable, Amended Claim 16 should be in condition for allowance. In addition, Claims 17, 18, and 20 should be in condition for allowance as patentably distinct, further limitations on Amended Claim 16. Finally, Claim 19 has been re-written to include a limitation of performing a grinding step that was removed from Claim 16 during amendment. Since this limitation represents a patentably distinct, further limitation on Amended Claim 16, Amended Claim 19 should, therefore, be in condition for allowance.

TSMC-00-166

Reconsideration of Claims 1-4, 6-12, 14-18, and 20, rejected under 35 U.S.C. 103(a) as unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Blalock (US 5,320,981) is requested based on the above remarks.

Applicant has reviewed the prior art made of record and not relied upon and agrees with the Examiner that while the references are of general interest, they do not apply to the detailed Claims of the present invention.

Allowance of all Claims is requested.

Attached hereto is a marked-up version of the changes made to the Claims by the current amendment. The attached pages are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

It is requested that should Examiner B. Kebede not find that the Claims are now Allowable that he call the undersigned at 989-686-3462 to overcome any problems preventing allowance.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Douglas R. Schnabel".

Douglas R. Schnabel, Reg. No. 47,927

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claim 9 has been amended as follows:

10. (Amended) A method to form bonding pad openings that prevent tape residue in the manufacture of an integrated circuit device comprising:

providing a semiconductor substrate;

5 [providing a metal layer overlying said semiconductor substrate;]

depositing a passivation layer overlying said [metal layer] semiconductor substrate;

10 depositing an organic photoresist layer overlying said passivation layer;

patterning said organic photoresist layer to expose said passivation layer in areas [overlying said metal layer] where passivation [said bonding pad] openings are planned;

15 reflowing said organic photoresist layer to create gradually sloping sidewalls on said organic photoresist layer wherein said reflowing is performed at a temperature

of between 140 degrees C and 200 degrees C for a duration
of between 3 minutes and 15 minutes;

20 etching through said passivation layer not covered by
said organic photoresist layer to form said [bond pad]
passivation openings with gradually sloping sidewalls;

stripping away said organic photoresist layer;

25 applying a protective tape overlying said passivation
layer and said [bond pad] passivation openings; and

removing said protective tape wherein said gradually
sloping sidewalls on said passivation openings allow the
protective tape to be completely removed without leaving
adhesive residue [and wherein said removing is by use of a
30 peeling tape in the manufacture of the integrated circuit
device].

Claim 13 has been amended as follows:

13. (Amended) The method according to Claim 9 wherein said
step of [reflowing said organic photoresist layer is
performed at a temperature of between about 140 degrees C
and 200 degrees C for a duration of between about 3 minutes
5 and 15 minutes] removing said protective tape is by use of
a peeling tape.

Claim 16 has been amended as follows:

16. (Amended) A method to form bonding pad openings that prevent tape residue in the manufacture of an integrated circuit device comprising:

providing a semiconductor substrate;

5 providing a metal layer overlying said semiconductor substrate;

depositing a passivation layer overlying said metal layer [wherein said passivation layer comprises silicon nitride];

10 depositing an organic photoresist layer overlying said passivation layer;

patterning said organic photoresist layer to expose said passivation layer in areas overlying said metal layer where said bonding pad openings are planned;

15 reflowing said organic photoresist layer to create gradually sloping sidewalls on said organic photoresist layer wherein said reflowing is performed at a temperature of between 140 degrees C and 200 degrees C for a duration of between 3 minutes and 15 minutes;

20 etching through said passivation layer not covered by
said passivation layer to form said bond pad openings with
gradually sloping sidewalls;
stripping away said organic photoresist layer;
applying a protective tape overlying said passivation
25 layer and said bond pad openings; and
[grinding the backside of said semiconductor
substrate; and]
removing said protective tape wherein said gradually
sloping sidewalls on said passivation openings allow the
30 protective tape to be completely removed without leaving
adhesive residue and wherein said removing is by use of a
peeling tape in the manufacture of the integrated circuit
device.

Claim 19 has been amended as follows:

19. (Amended) The method according to Claim 16 [wherein
said step of reflowing said organic photoresist layer is
performed at a temperature of between about 140 degrees C
and 200 degrees C for a duration of between about 3 minutes
5 and 15 minutes.] further comprising grinding the backside
of said semiconductor substrate after said step of applying

TSMC-00-166

a protective tape and prior to said step of removing said
protective tape.